

DEVELOPMENT OF A COASTAL LOW-GRADIENT EXPERIMENTAL WATERSHED IN SUPPORT OF THE US ARMY SURFACE WATER MODELING RESEARCH

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This poster reports on establishing a new experimental coastal low-gradient watershed. The Isaac-Verot watershed is located in south central Louisiana and is part of the Vermilion River basin that connects to the Vermilion Bay of the Gulf of Mexico. Isaac-Verot is a combined rural-urban watershed and has an area of approximately 28 km² with extremely flat overland slope. The experimental watershed is densely populated with various hydrologic and meteorological stations that provide a real-time continuous stream of high-resolution, high-quality observations. The main focus of data collection in the new watershed is to support research efforts in the field of watershed hydrology. The collected data will facilitate and serve many specialized research studies that aim to understand and model the complex physical processes that control the hydraulic and hydrologic systems in coastal, low gradient watersheds. The data have potential benefits for development, testing, and improvement of the US Army Corps of Engineers numerical surface water hydrologic models.

The design of the watershed instrumentation was done in such a way to provide data with high spatial and temporal resolution (See Figure). Equipment include the following instruments:

- 24 tipping-bucket rain gauges with a 12" diameter. All gauges are arranged in dual-gauge setup to ensure uninterrupted, high-quality rainfall measurements.
- One discharge gauge at the outlet, and additional two discharge gauges at interior locations. All gauges are YSI Sontec acoustic devices that also collect stage measurements.
- One weather station that measures solar radiation, wind speed and direction, soil moisture, relative humidity, air temperature, and barometric pressure.
- A rainfall disdrometer of the Joss-Waldvogel impact type that provides high-resolution measurements of rainfall drop size distribution.

Instrumentation at each gauging site is equipped with a data acquisition telemetry system that collects, stores, and transmits the data to an archival system at the University of Louisiana at Lafayette. Future efforts will be devoted to incorporate the collected data into a comprehensive database that can be easily accessed via the Internet.

The Isaac-Verot coastal watershed has unique and challenging hydraulic and hydrologic characteristics that are caused by the combination of tidal effects and extremely low overland slopes. Therefore, monitoring such watersheds will generate multi-disciplinary cooperation among researchers from the various army laboratories and universities. Such cooperation can cover several areas such as: watershed analysis, rainfall-runoff numerical modeling, computational methods for complex hydraulic systems, severity and frequency of inland flooding, hydrologic applications of remote sensing precipitation and soil moisture data, effects of land-use and land-cover changes, and impact of sea level rise on the hydrologic response of low-gradient coastal watersheds. The data collected in this watershed will be used to support the hydrologic modeling capabilities of the US Army Corps of Engineers. The authors are currently involved with the Coastal and Hydraulic Laboratory at the Engineering Research and

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Development Center (ERDC) in the development of the GSSHA hydrologic modeling system. Since the Isaac-Verot low-gradient watershed has complex hydraulic and hydrologic characteristics that are quite challenging to simulate and predict, testing of GSSHA on this watershed and comparing it to other hydrologic modeling systems will be valuable to identify the capabilities, limitations and needs for future developments.

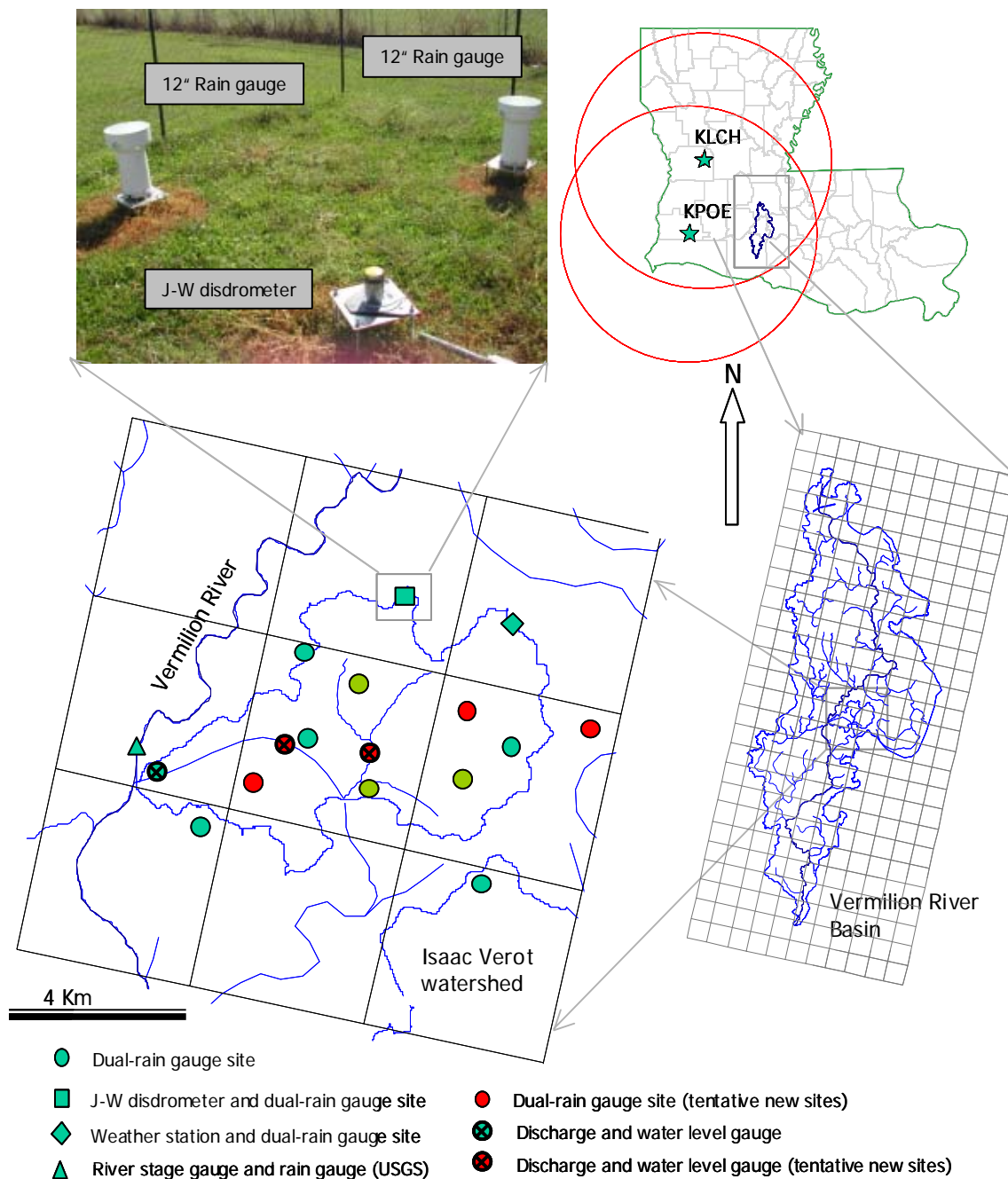


Figure 1: The Isaac-Verot experimental watershed in south Louisiana. Rectangular pixels represent the grid of the two closest NEXRAD radars. The insert picture shows an example of one of the instrumental sites.